5.0 NATURAL GAS SUPPLY

A new 12-inch diameter pipeline, approximately 2.0 miles long, will supply natural gas to the Pico Power Project (PPP). This section describes the proposed gas supply line route, as well as the construction and operating practices. During the project development phase, SVP commissioned a natural gas pipeline alternatives and constructibility review. This section summarizes the results of the review. The full study text can be found in Appendix 5-A. Four natural gas pipeline routes were identified and considered in the study, along with alternatives for locating the gas metering station and alternative crossings of US 101. The route selected is called the Lafayette Street route and is described in this section. The alternative routes are described in detail in Appendix 5-A and discussed in Chapter 9. The Lafayette Street route was chosen as the preferred route because this route faces the fewest permitting and constructibility obstacles and would be the most economical to construct.

5.1 PROPOSED NATURAL GAS PIPELINE ROUTE

The new 12-inch diameter pipeline will connect with PG&E's gas distribution pipeline, Line 132, near the corner of Gianera Street and Wilcox Avenue north of the project site in Santa Clara (Figure 5.1-1). The natural gas pipeline route will start at a gas metering site (see below), proceed easterly beneath the UPRR tracks and proceed south down Lafayette Street. The centerline of the pipeline will be approximately 12 feet east of the western curb line (i.e., the pipeline will be located in the outside southbound lane of Lafayette Street). The alignment will proceed south on Lafayette Street to the intersection of Lafayette Street and Aldo Street. The pipeline will then proceed to the west across the UPRR tracks and south on Bassett Street. The railroad crossing will be by bored-and-jacked casing. At Bassett Street and Laurelwood Road, the pipeline will cross under Highway 101 through a bored and jacked casing. The casing will extend from Laurelwood Road to Duane Avenue. The pipeline will then proceed south to the Pico Power Plant site and cross Lafayette Street to the gas compressor station. In the vicinity of the Pico Power Plant, a lateral pipeline will branch off to feed the duct burners. A compressed gas pipeline will proceed from the compressor station to the Pico Power Plant. It is anticipated that the three pipelines crossings of Lafayette Street will be constructed in the same trench.

5.1.1 Highway 101 Crossing

The Highway 101 crossing alignment shown on Figure 5.1-1 on will start at the northeast corner of Bassett Street and Laurelwood Road and will run south to Duane Avenue to the Pico Power Plant site. The pipeline will be installed in a bored and jacked casing under Highway 101. The private parking lot at the northeast corner of Bassett Street and Laurelwood Road will be used as the jacking pit area. The receiving pit will be located adjacent to Duane Avenue.

5.1.2 Gas Metering Facility

PG&E estimates the gas metering facility will need approximately 30 feet x 60 feet of space. It will be located in an existing bicycle and pedestrian path area that runs north from the east end of Gianera Street (at Wilcox Avenue) to the Hetch Hetchy Aqueduct right-of-way and beyond the right-of-way, to Stars and Stripes Drive. The existing bicycle and pedestrian path is situated between Gianera Street residences and the Union Pacific Railway soundwall. The metering facility will be between the existing bike path to the east and the existing residential fence to the west. The bike path will need to be partially realigned to the east to accommodate the metering facility. One of the two following options would be used for mitigating access and security concerns regarding the metering site:

- Constructing 6-foot-high walls (20 feet by 40 feet) around the metering facility which would blend in with surrounding development.
- Installing a new security fence around the facility, with a gate to allow vehicle access from Gianera Street. Landscaping is planned to help the facility blend in with its surroundings.

The metering station lies just north of the Line 132 tap in Gianera Street. From the metering station, the natural gas pipeline will run east to Lafayette Street, crossing under a sound wall and the Union Pacific Railroad (UPRR) tracks. The gas metering facility will be designed to avoid existing utilities in the vicinity, such as the 24-inch recycled water pipeline, or an underground electric and overhead electrical line.

5.2 DESIGN CRITERIA

Pipeline design criteria are found in Table 5.2-1. The pipe material will be welded steel pipeline with epoxy coating on the exterior. Cathodic protection will be provided. A manually operated ball valve will be installed on each end of the pipeline. Regulatory requirements do not require installing intermediate valves on pipelines shorter than 2.5 miles in length. However, to allow the pipeline to be isolated into two sections in case of emergency, one ball valve will be installed at the approximate midpoint of the pipeline.

Table 5.2-1. Natural gas pipeline design criteria.

Parameter	Unit	Comments
Working pressure	200-375 psig	Min line pressure is 200 psig
Design pressure	400 psig	Class 300 pipe
Pipe size	12 inches	Based on minimum pressure
Minimum cover	36 inches	-
Minimum vertical clearance between existing utilities	12 inches	-
Minimum horizontal clearance	12 inches	-

The pipeline will also be designed in accordance standards established by the City of Santa Clara Engineering Department and PG&E.

5.3 CONSTRUCTION PRACTICES

Most of the natural gas pipeline will be constructed using a backhoe to excavate a trench for the pipe. It will be necessary to close one or two lanes of roadway while the pipeline is being installed. At locations where the alignment proceeds across jurisdictional agency right-of-ways such as Union Pacific Railroad at the railroad tracks and Caltrans at Highway 101, a trenchless installation method will be required. The bore-and-jacked casing technique will be used for these crossings, since this is the most viable alternative for these relatively short distances. The following describes both the trenching and trenchless construction methods to be used for the project.

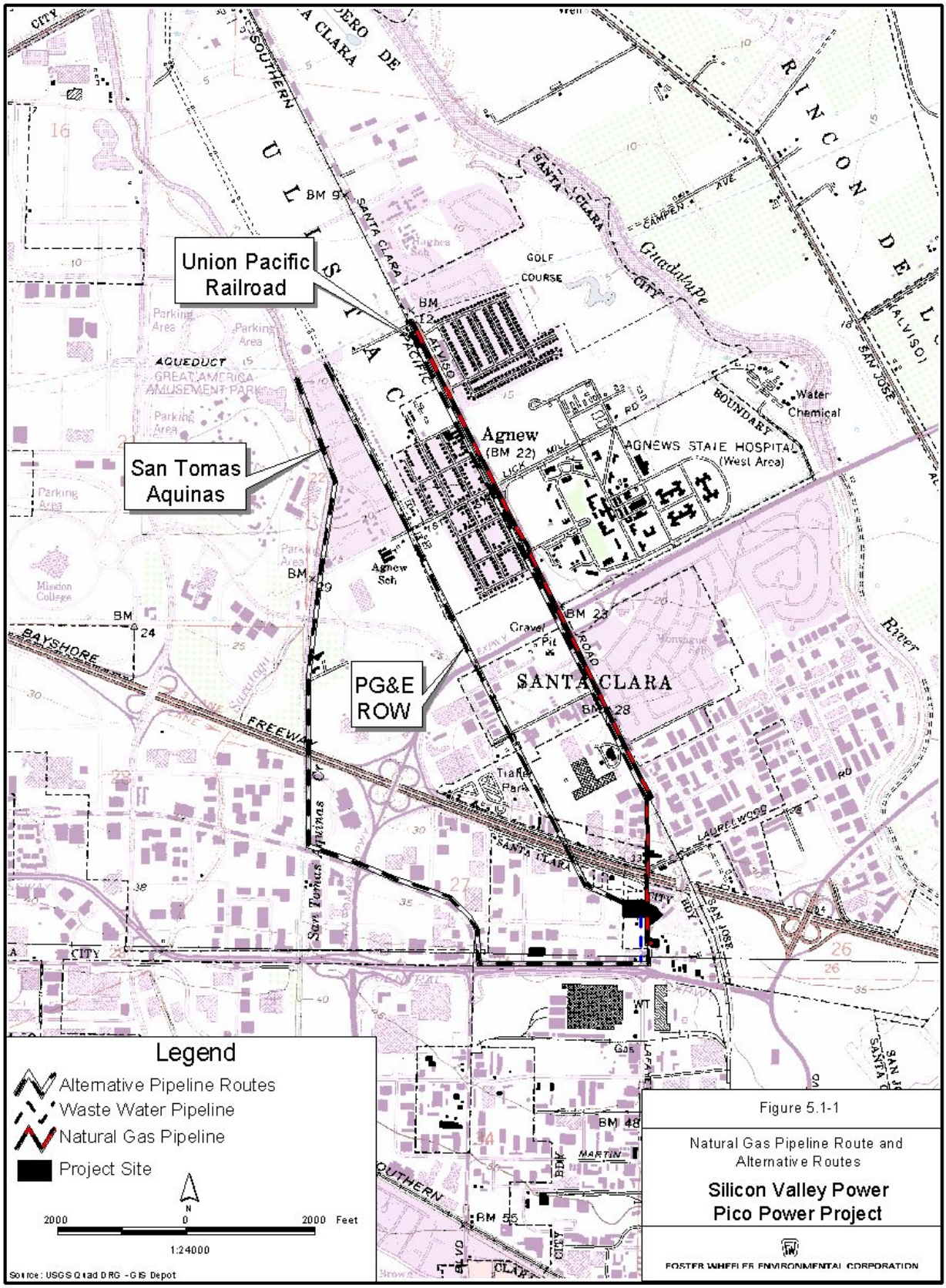

Figure 5.1-1

Natural Gas Pipeline Route and Alternative Routes

Silicon Valley Power
Pico Power Project

FOSTER WHEELER ENVIRONMENTAL CORPORATION

5.3.1 Trenching Methods

The preferred installation method for the pipeline is by conventional open trench. The estimated trench width, assuming that the trench is shored, is 2 to 3 feet. If the trench is unshored, then the width could be up to 12 feet wide at the top. Approximately 10 feet adjacent to the edge of trench will be required for equipment access. The natural gas pipeline will be constructed with a minimum of at least one crew ("spread") working continuously along the pipeline ROW. Most major pieces of construction equipment (backhoes and trucks) may remain in the existing on-street parking lanes along the pipeline ROW during the course of construction. In addition to providing worker parking, the laydown area will serve as the primary location for storing pipe and other pipeline construction materials. Any additional storage locations will be in existing paved or graveled areas along the pipeline route. Pipeline construction will take approximately 6 months and is expected to occur during the summer of 2003. The following are key construction steps:

1. **Trenching—** Trench width will depend on the type of soils encountered and underground obstructions. Trench depth will be sufficient to meet the requirements of the controlling authority. However, the pipeline will be buried to provide a minimum cover of 36 inches. The excavated soil will be piled on one side of the trench and used as backfill after the pipe is installed in the trench. The pipeline will be installed through trenching at all locations.
2. **Stringing—** Stringing will consist of trucking lengths of pipe to the ROW and laying them on wooden skids beside the open trench.
3. **Installation—** Installation will consist of bending, welding, and coating the weld joint areas of the pipe after it has been strung, padding the ditch with sand or fine spoil, and lowering the pipe string into the trench. Bends will be made by a cold bending machine or shop fabricated as required for various changes in bearing and elevation. Welding will meet the applicable API standards and be performed by qualified welders. Welds will be inspected in accordance with API Standard 1104. Welds will undergo 100 percent radiographical inspection by an independent, qualified radiography contractor. All coating will be checked for holidays (i.e., defects) prior to lowering into the trench.
4. **Backfilling—** Backfilling will consist of returning spoil back into the trench around and on top of the pipe, ensuring that the surface is returned to its original grade or level. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.
5. **Plating—** Plating will consist of covering any open trench at the end of a workday with steel plates to ensure public safety. Plates will be removed at the start of each workday. Efforts will be made to minimize the length of open trench along the ROW.
6. **Hydrostatic Testing—** Hydrostatic testing will consist of filling the pipeline with water, venting all air, increasing the pressure to the specified code requirements, and holding the pressure for a period of time. It is expected that the fresh water required can be drawn from the municipal water supply. After hydrostatic testing of the pipeline, the test water will be chemically analyzed for contaminants and discharged into a dewatering structure consisting of hay bales, geotextile fabric, and silt fencing. The discharged water will filter through the hay bales and silt fence onto a jute matting before it is discharged. Temporary approvals for test water use and permits for discharge will be obtained as required.
7. **Cleanup—**Cleanup will consist of restoring the surface of the ROW by removing any construction debris, grading to the original grade and contour, and repairing and repaving where

required.

8. **Commissioning**—Commissioning will consist of drying the inside of the pipeline, purging air from the pipeline, and filling the pipeline with natural gas.
9. **Safety**—A construction safety plan will be prepared for the project. This plan will address specific safety issues, such as working in an active railroad right-of-way, traffic control, working along traveled city streets, and other areas as required by permits.

5.3.2 Bored-and-Jacked Casing

Boring and jacking is an underground method of installing a casing pipe by using a horizontal boring machine or auger to advance the tunnel bore. The bore length is generally determined by the soil conditions but is usually 1,000 feet or less. The casing pipe is normally one to two standard pipe sizes larger than the pipeline being installed. In this case, the casing pipe will likely be 18 inches in diameter. The casing is installed by pushing a line of casing pipes through the bore hole with hydraulic rams from a jacking pit. Excavation for this procedure is carried out at the forward end of the leading pipe or from a shield in front of the leading pipe as the pipeline is pushed from the jacking pit. The jacking pit is expected to be about 40 feet long and 15 feet wide, and the receiving pit about 15 feet by 15 feet.

After advancing the pipe segment into the augered hole, a new pipe segment is placed in the pit and the process is repeated. When a shield is used, hydraulic jacks provided between the shield and the lead pipe can be used to adjust the alignment of the shield. In general, the cutting face of the shield or boring machine typically cuts an excavation that is larger in diameter than the outside diameter of the remainder of the shield or the pipe. The overcut reduces friction between the pipe and soil during advance and improves steerability of the shield. To further reduce friction on long drives, and to help prevent movement of the soil into the resulting annular space, the annular space is commonly filled with bentonite slurry under pressure. After the casing is installed, the pipe is installed inside the casing.

5.4 PIPELINE OPERATIONS

The proposed gas supply pipeline will be designed, constructed, and operated in accordance with Title 49, Code of Federal Regulations, Part 192 (49 CFRI92) and the California Public Utility Commission's General Order (G.O.) 112-E. Specifically, the pipeline will be designed in accordance with the standards required for gas pipelines in proximity to populated areas, based on actual population densities along the proposed pipeline route. It will be buried a minimum of 36 inches, as required by Santa Clara County or Caltrans.

An operations and maintenance plan will be prepared addressing both normal procedures and conditions, and any upset or abnormal conditions that could occur. Periodic cathodic protection surveys will be performed along the pipeline, as required by 49 CFR 192 and G.O.112-E. The pipeline will be under a continuous cathodic protection system.

The proposed pipeline will adopt a proactive damage prevention program. Markers identifying the location of the pipeline will be placed at all road crossings. The markers will identify a toll-free number to call prior to any excavation near the pipeline. Buried warning tape will be placed above the pipeline to warn of its presence.

The transported gas will be odorized as received from PG&E's main pipeline. PG&E will develop an emergency plan to provide prompt and effective responses to upset conditions detected along the pipeline or reported by the public.

Isolation block-valves will be installed at both ends of the proposed pipeline. These valves will be manually controlled, lockable, gear-operated ball valves. Only PG&E will have access to the isolation block valve at the mainline tap, and the PPP alone will have access to the downstream isolation ball valve at the PPP property. A pipeline Supervisory Control and Data Acquisition (SCADA) system will provide flow rate and pressure data to PG&E and the PPP.

5.5 ON-SITE FUEL SUPPLY SYSTEM

A description of the fuel supply system within the PPP is provided in Section 2.2.

5.6 PERMITS AND PERMITTING SCHEDULE

The natural gas pipeline will need to cross over and under existing easements throughout the alignment. These easements include jurisdictional right-of-ways associated with railroads, highways, major utilities and expressways, and are shown on Figure 5.5-1. The permitting agencies were contacted to request information on crossing requirements. Permit requirements for the various agencies are summarized in Table 5.6-1. We anticipate that the bore-and-jack construction method will be used to install casing pipes at these crossings. The final crossings design will be based on specific requirements of the permitting agencies described below. Additional permitting information is found in Section 8.6 (Land Use).

Table 5.6-1. Encroachment permits required and responsible agencies.

Location	Agency	Crossing Type[1]	Schedule	Length
Gas metering facility	PG&E	NA	4-8 weeks	-
Metering station to Lafayette	Union Pacific Railroad	Railway	4-8 weeks	150
Lafayette Street and Montague Expressway	Santa Clara County Roads and Airports Department	Roadway/highway	4-6 weeks	-
Lafayette Street to Bassett Street	Union Pacific Railroad	Railway	4-8 weeks	150
US Highway 101	Caltrans	Roadway/highway	8 weeks	300
All City streets	City of Santa Clara	NA	4-6 weeks	NA

[1]Casing depth varies depending on Agency requirements and depth of existing utilities, but typically ranges from 8 to 20 feet. Casing diameter is 18 inches.

5.6.1 County of Santa Clara

The pipeline alignment crosses under Santa Clara County's Montague Expressway. The County of Santa Clara requires an encroachment permit for crossing expressways in the City of Santa Clara, even when the crossing will be underneath a bridge. The encroachment permit titled County of Santa Clara Land Development Permit Application needs to be filed with the County Roads and Airport Department prior to commencing any work on County's right-of-way. Additional requirements include:

- Submitting the plan and profile drawing (60% Design Level) of the expressway crossing to the County for review. The County review takes approximately 4-6 weeks.

- Providing the encroachment permit fees to the County.
- If potholing of existing utilities is anticipated on County's right-of-way, additional fees must be submitted to the County prior to beginning work. Potholing requirements will be determined during final design, based on a survey of the pipeline alignment.

5.6.2 City of Santa Clara

A City of Santa Clara Street Opening Permit will be required for work in City streets, right-of ways, sites, easements and parks. Since most of the pipeline alignment will be within City streets, this permit will apply to most of the project. The permit is available at the City's Engineering Department. The construction contractor will obtain the permit at the beginning of construction. The permit requires the contractor to have a valid City of Santa Clara business license. SVP will be required to pay any inspection fees imposed by the City.

5.6.3 Union Pacific Railroad (UPRR)

The crossing of Union Pacific Railroad tracks is anticipated at two locations. The requirements for working on UPRR right-of-way and crossing of railroad tracks include:

- Submitting a permit titled *Permit To Be On Railroad Property for Nonintrusive Civil Engineering Survey Work* prior to conducting any survey work on UPRR property.
- Entering into a written agreement between UPRR and the City before any construction begins on a new crossing.
- Submitting a completed application and a nonrefundable payment of $500.00 (made payable to Union Pacific Railroad Company, Federal Taxpayer Identification No. 94-6001323) of new crossings to the appropriate UPRR manager for the Santa Clara area for preliminary engineering review.
- Submitting plan and profile drawings (60% design level) of the crossings that include the requirements as indicated on the Encased Flammable Pipeline Crossing drawing. UPRR review will take approximately 4-8 weeks.
- Obtaining insurance necessary prior to proceeding with the construction of the crossing. The amount shall include the cost of the coverage and a Union Pacific administrative fee. Typical insurance requirements are: General Public Liability providing $2 million for each occurrence and general aggregate limit of $4 million; Automobile Public Liability providing $2 million for each occurrence; Worker's Compensation covering the statutory liability determined by state law; Railroad Protective Liability providing $2 million for each occurrence and aggregate limit of $6 million.

5.6.4 Cal-OSHA Mining and Tunneling Unit

CAL-OSHA issues underground classifications for bore-and-jacked casings that are 30 inches in diameter or more. The bore-and-jacked crossings for this project are expected to be under 30 inches in diameter, so the classification and associated permits will not be required.

5.6.5 California Department of Transportation (CalTrans)

The California Department of Transportation requires an encroachment permit for the crossing of Highway 101. The requirements for crossing Highway 101 include:

- Submitting an encroachment permit application along with plan and profile drawings of the crossing. Caltrans' stated policy is to either approve or deny the permit application package within 60 calendars days after it has been received.
- Submitting an application fee, which will be determined and billed to the City at a later date.
- Designing the crossing to maintain normal (90 degrees) to the highway alignment where practical. Caltrans normally allows only skews of up to 30 degrees from normal.
- Installing the new pipeline under the existing roadbed and median by boring and jacking, directional drilling, or other methods approved by Caltrans.
- Maintaining the boring and jacking pits behind the Highway 101 curb line.
- Monitoring of roadbed settlement throughout the jacking and boring operation.